

# WIDE FREQUENCY RANGE VOLTAGE-CONTROLLED OSCILLATORS

## Abstract

A structure for a delay cell in a Voltage-Controlled Oscillators (VCO) and method for operating the delay cell. The delay cell comprises a latch and an impedance circuit (comprising resistance and capacitance elements). The impedance circuit electrically couples different nodes of the latch, a supply voltage, and ground. By adjusting the resistance of the impedance circuit, the time needed for the latch to switch states in response to the switching of an input coupled to the latch is adjusted accordingly. By choosing the appropriate nodes of the delay cell as input and output nodes of the delay cell, the delay time of the delay cell can be adjusted by adjusting the resistance of the impedance circuit. As a result, the operating frequency range of the VCO can be widened compared with prior art. Similar impedance circuits can be added to the delay cell to expand the operating frequency range of the VCO.